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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/769,082	01/24/2001	George Stephen Mecherle	258/237	6427

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EXAMINER
SINGH, DALZID E

ART UNIT	PAPER NUMBER
2633	12

DATE MAILED: 06/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/769,082	MECHERLE ET AL.	
	Examiner	Art Unit	
	Dalzid Singh	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *107-122* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-122* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 107-122 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stann et al (US Patent No. 5,877,851) in view of an article "*Wideband Lasers and Receivers for Lasercom Application*" by Carlson et al (hereinafter "Carlson et al").

Regarding claim 107, Stann et al disclose LADAR architecture comprising the method of:

providing a wideband input signal (see col. 3, lines 12, since the signal is radio frequency (rf signal), therefore it is a wideband signal).

Stann et al disclose power amplifier coupled with a matching circuit (130) which provides low output impedance to the laser diode (see col. 3, lines 14-17) to drive and modulate the laser diode (see col. 3, lines 12-14) and differ from this claim in that Stann et al do not specifically disclose providing a power amplifier with a low output impedance suited to drive a laser diode without the use of a matching circuit. However, Carlson et al teach the use of wideband hybrid laser driver, in which the low impedance of the laser is matched by the low output impedance of rf drive power circuit (i.e., power amplifier), see 2nd column, 3rd paragraph of page 412. Since the laser diodes have input impedance and the use of low output power amplifier is well known, as evidenced

by Carlson et al, therefore it would have been obvious to provide low output impedance power amplifier in order to match the low impedance of the laser diode. The motivation of providing a match impedance of the power amplifier and the laser diode without using a impedance math circuit is to be able to reduce power loss, reduce cost of manufacturing and facilitate manufacturing process.

Furthermore, Stann et al differ from this claim in that Stann et al do not specifically disclose that the power amplifier operate as a voltage-controlled current driver for the laser. However, since the laser diode is current controlled, therefore it would have been obvious that the power amplifier operate as voltage controlled in order to vary current going to the laser diode (see col. 3, lines 21-24).

Regarding claim 108, Stann et al disclose selecting minimum and maximum power levels for the laser diode and supplying bias current to the laser diode to operate the laser at the selected average power level supplying widebạnd modulation to cause the laser output to vary between selected minimum and maximum output power levels (see col. 7, lines 50-56), see claim 107.

Regarding claim 109, the combination of Stann et al and Carlson et al differs from this claim in that the combination does not specifically disclose that the input signal is characterized by a rate of at least 10 Mbits/second and the power amplifier provides output current of at least 100 mA to the laser diode. However, since the input signal is adjustable and the current going to the laser diode is adjustable, therefore it would have been a matter of design choice to provide a specific input pulse rate and operating current in order to provide a efficient operating parameters of the laser diode.

Regarding claim 110, Stann et al disclose as described in claim 107, the power amplifier is operated as a voltage-controlled current source by DC biasing the power amplifier with a gate voltage to provide linear modulation of the laser drive current.

Regarding claim 111, the combination of Stann et al and Carlson et al differs from this claim in that the combination does not specifically disclose that the modulation of the power amplifier output causes the laser drive current to swing from nearly off to the desired output power with an optical power extinction ratio of at least 10:1. However, since the input signal is in digital form (in 0's and 1's), therefore it would have been obvious to indicate the input signal swing from off (in 0 state) to on (in 1 state).

Regarding claim 112, since the current level is varied therefore, the output power of the laser driver is adaptive (see claim 109).

Regarding claims 113 and 115, since the input signal is in digital form therefore the input signal controlling the laser output power in multiple discrete steps.

Regarding claim 114, in col. 3, lines 21-24, the input signal controlling the laser output power is accomplished by simultaneously controlling the power amplifier gate bias voltage, bias current of the laser diode, and modulation current of the laser diode using an input signal.

Regarding claim 116, the combination of Stann et al and Carlson et al differs from this claim in that the combination does not specifically disclose an attenuator used to attenuate the modulation signal. However it would have been obvious to an artisan of ordinary skill in the art to provide attenuator in order to control fluctuation of input signal level.

Regarding claim 117, Stann et al disclose the modulation on the laser drive current (see col. 3, lines 12-14).

Regarding claim 118, it appears that the modulation is a telemetry signal since it is in digital form.

Regarding claims 119 and 120, the combination of Stann et al and Carlson et al differs from these claims in that the combination does not specifically disclose that the modulation is a tracking tone and the frequency of the modulation is between 50 Hz and 50 kHz. However, it would have been a matter of design choice to provide modulation of tracking tone and modulation in specific frequency in order to transmit control information with minimal interference.

Regarding claims 121 and 122, as shown in Fig. 1, it appears that the current and the amplitude of the laser diode is monitored.

3. Claims 107 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hesterman (US Patent No. 4,748,634).

Regarding claim 107, Hesterman et al disclose pumping system for laser comprising the method of:

providing a wideband input signal (see col. 2, lines 22-34, the signal is radio frequency therefore it is wideband);

Hesterman discloses power amplifier coupled with a matching circuit (16) which provides low output impedance to the laser diode (see col. 2, lines 24-34 and Fig. 1) to drive and modulate the laser diode and differs from this claim in that Hesterman does

not specifically disclose providing a power amplifier with a low output impedance suited to drive a laser diode without the use of a matching circuit. However, Carlson et al teach the use of wideband hybrid laser driver, in which the low impedance of the laser is matched by the low output impedance of rf drive power circuit (i.e., power amplifier), see 2nd column, 3rd paragraph of page 412. Since the laser diodes have input impedance and the use of low output power amplifier is well known, as evidenced by Carlson et al, therefore it would have been obvious to provide low output impedance power amplifier in order to match the low impedance of the laser diode. The motivation of providing a match impedance of the power amplifier and the laser diode without using a impedance math circuit is to be able to reduce power loss, reduce cost of manufacturing and facilitate manufacturing process.

Furthermore, Hesterman differs from this claim in that Hesterman does not specifically disclose that the power amplifier operate as a voltage-controlled current driver for the laser. However, since the laser diode is current controlled, therefore it would have been obvious that the power amplifier operate as voltage controlled in order to vary current going to the laser diode (see col. 3, lines 22-34).

Response to Arguments

4. Applicant's arguments with respect to claims 107-112 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Suzuki (US Patent No. 3,939,435) is cited to show power amplifier.

Burley et al (US Patent No. 4,995,045) is cited to show laser control circuit.

Habel et al (US Patent No. 5,579,328) is cited to show digital control of laser diode power levels.

Binkley et al., "A Low-Noise, Wideband, Integrated CMOS Transimpedance Preamplifier for Photodiode Applications", IEEE conference, pages 730-734, 1991.

Ayling et al., "First Demonstration of a High Power, Wide Band Microwave Amplifier Based Upon an Optically Coupled Transistor", IEEE, pages 39-42, 1999.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is 703-306-5619. The examiner can normally be reached on Mon-Fri 8am - 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703-305-4729. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600